Improving Survival Success Rates with Honey bee Colonies through Supportive Cohorts

Meeting #13 Challenges Facing Beekeepers with Jeremy Barnes

Project Leader:	Tiffany Ayres, CEO Keys to Bees, Master Beekeeper
Project Consultant:	Marty Jones, PhD
Project Partner:	Kim Patten, Manager Diakon Wilderness Greenhouse
Project Partner:	Lindsey Lyons, Director of Sustainability Learning Dickinson College

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under subaward number PG24-021.

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SARE made funding possible.

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The NIFA fund research and education projects to support sustainable agriculture; funding projects that help farmers, ranchers, and educators develop new ideas and strategies.

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Jeremy has spent his life living and working in England,Rhodesia/Zimbabwe, South Africa and the United States, with the opportunity to visit with beekeepers in a variety of European and African countries in-between. An educator by profession, with a focus on history, and group dynamics, he was asked in 2009 to write a column for the Pennsylvania State Beekeepers' Association newsletter; 16 years later "Jeremy's Column" still appears monthly. Some of his writings were published in 2018 as "Our Green Cathedral : Reflections on Honev Bees. The Environment and the Human Condition." Recognized as Pennsylvania's Beekeeper of the Year in 2017, Jeremy's prime interest for the past five years has been Regenerative Beekeeping. Akin to Regenerative Agriculture, it is an attempt to be more bee-centric in one's practices, in particular recognizing the conditions that honey bees, after some 30 million years of evolution, select for themselves

TOPIC: Focus on upcoming challenges facing beekeepers, with solutions. Two in particular: what we can learn from recent studies of feral hives, in particular beekeeping that is based more on the health of the bees and less on the needs of the beekeeper;
recent discoveries in genetics as they relate to honey bees and their management.

https://www.ydr.com/story/news/2017/11/08/pa-s-king-beekeeper-york-county/839347001/

https://www.911honey.com/product-p/gc-jb.htm

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Three Current Challenges Facing Beekeepers

4

How to Keep Bees books are written by established beekeepers,
and beekeeping classes are taught by established beekeepers .
The danger is that age-old practices are either not called into question,
or re-evaluated and brought up-to-date.

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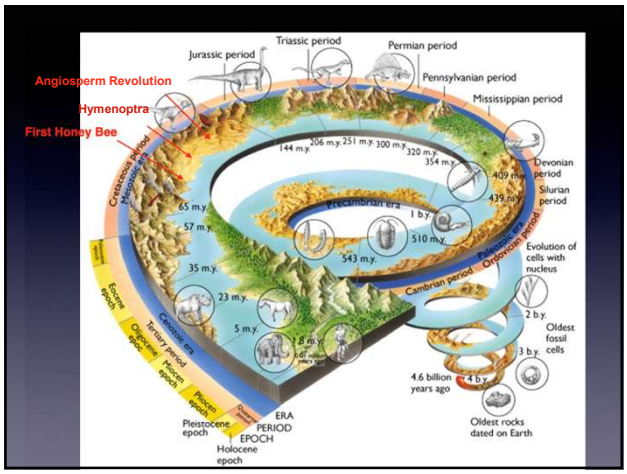
re-evaluated and brought up to date.

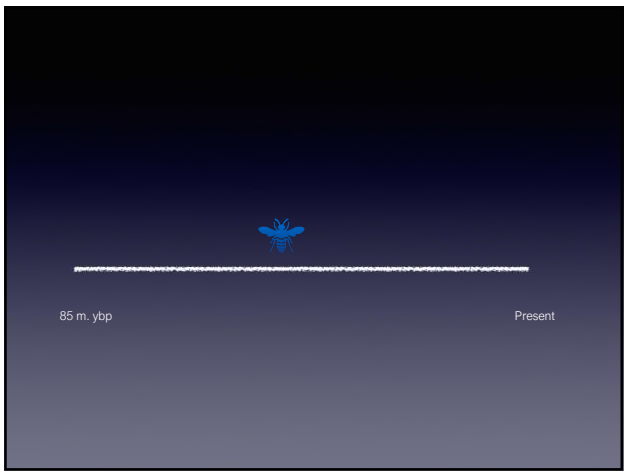
eg. all the new behavior about bee genetics, ecology and evolution has not
led to fundamental changes in beekeeping.

Jacques van Alphen
Honey Bees : A Natural and a Less Natural History.

6


Angiosperm Revolution
Hymenoptra
First Honey Bee
Jurassic period
Triassic period
Permian period
Pennsylvanian period
Mississippian period
Devonian period
Silurian period
Precambrian era
Evolution of cells with nucleus
Oldest fossil cells
4.6 billion years ago
Oldest rocks dated on Earth
Cretaceous period
Mesozoic era
Paleozoic era
Cambrian period
Ordovician period
Cenozoic era
Tertiary Period
Eocene epoch
Oligocene epoch
Miocene epoch
Pliocene epoch
Pleistocene epoch
Holocene epoch
ERA
PERIOD
EPOCH

7


85 m. ybp
Present

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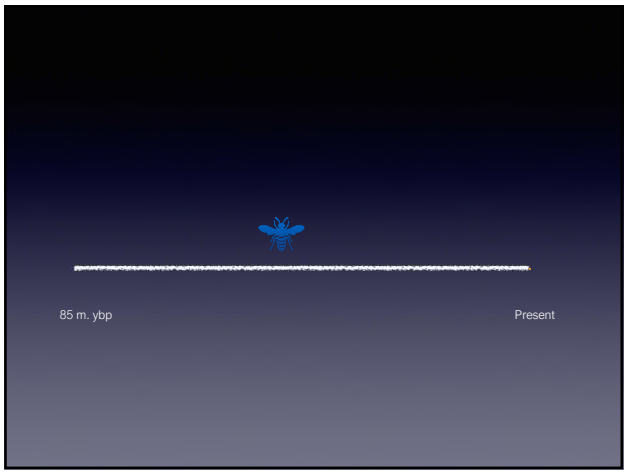
85 m. ybp
Present

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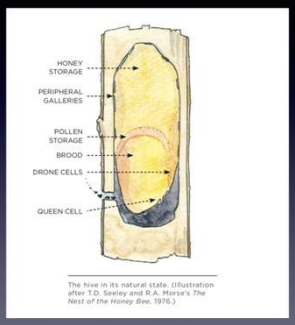
The Hive Body

10



The hive in its natural state. (Illustration after T.D. Seeley and R.A. Morse's *The Nest of the Honey Bee*, 1976.)

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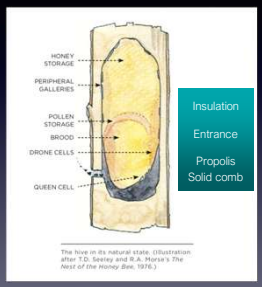


The hive in its natural state. (Illustration after T.D. Seeley and R.A. Morse's *The Nest of the Honey Bee*, 1976.)

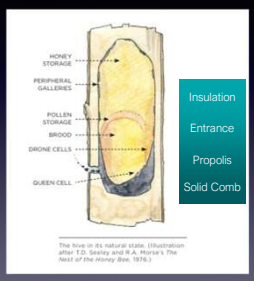
Insulation

Entrance

Propolis

Solid comb

12



Insulation

Entrance

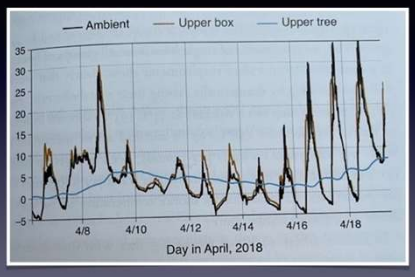
Propolis

Solid Comb

13

- Overall volume
- 10 - 25% drone comb
- Distance between hives

14



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Genetics

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Genetics

In other species, the 'cubs' are kicked out to fend for themselves.

Why, in a swarm of honey bees, does the old queen depart,

leaving a virgin queen with the colony?

19

Genetics

Pathogens and viruses - shorter generation times + larger populations than bees.

Therefore they
- often produce new mutants
- can quickly adapt to the environment within a colony.

Bees have no red blood corpuscles
So how do they fight against pathogens and viruses?

20





Bee behavior

21

The Microbiome

The community of microorganisms, including bacteria, fungi, and viruses, that live together in a specific environment, such as the body of a human or honey bee.

It plays a crucial role in health by interacting with the host and influencing various biological processes.

22

Recombination of DNA

How often does the DNA combination in a hive change

and how does it happen?

23

24

is present, the genetic make-up of the

roduces new alleles* to the colony, counteracting the adaptations

*alternative forms of a gene caused by mutation and found at the same place on a chromosome.

25

Implications for the Beekeeper

n a higher risk of infectious diseases for the colony because th

26

Swarming is a natural process integral to the health of a hive.

27

If you cannot allow swarms …

28

If you cannot allow swarms …

…a walk-away split using a nuc and the old queen

29

NB. the myth that swarming reduces honey production

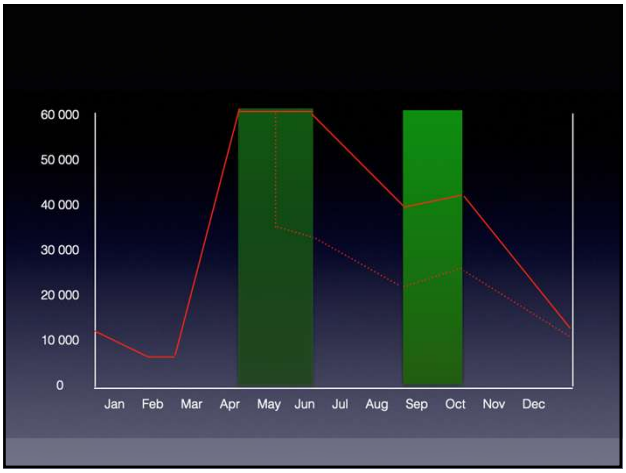
30

2. The Importance of Multiple mating

31

3. Feeding the Bees

32



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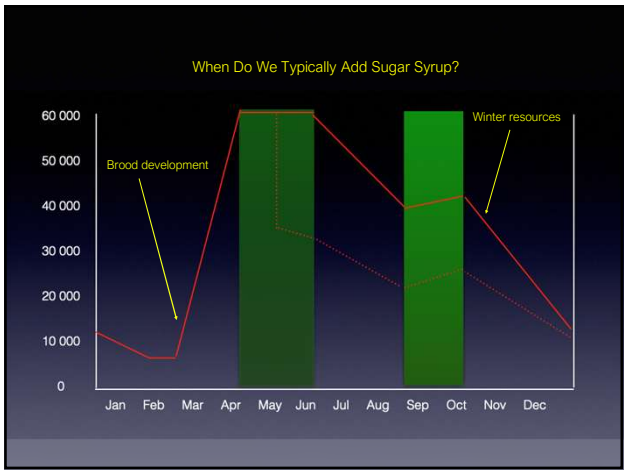

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Background to feeding sugar syrup

C19th writers - emergency only

Canada, 1940's - economics > bee health

35

Background to feeding sugar syrup

C19th writers - emergency only

Canada, 1940's - economics > bee health

And now it is taken for granted as essential!

36

Property	Honey	Sugar
Carbohydrate	✓	✓
acid pH buffered	✓	×
Probiotic bacteria, e.g. Lactobacillus[209]	✓	×
Bacteria inhibiting AFB and EFB growth[210]	✓	×
Glucose oxidase > hydrogen peroxide (antimicrobial)[211]	✓	×
Phytochemicals: polyphenols & flavonoids with antimicrobial activity[212]	✓	×
Diversity of antimicrobial activity of stored honeys[213]	✓	×
Macroelements (Na, K, Ca, Mg, P, S, Cl)	✓	×*
Trace elements (47 detected)[214]	✓	×*
Non-protein amino acids – phagostimulatory in nectar[215]	✓	×
Enzymes e.g. invertase, proteases[216]	✓	×
Vitamins e.g. vitamin C and six B vitamins[217]	✓	×
Up-regulation of detoxification genes[218]	✓	×

* *Minerals are present in the water used to make sugar syrup.*

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Summary of Impact of Feeding Sugar in the spring

Emerging bees are

higher in numbers
lower in weight
smaller in size

and . . .

38

Summary of Impact of Feeding Sugar in the spring

Emerging bees are

higher in numbers
lower in weight
smaller in size

and . . .

with their immune system destroyed

39

So … do you feed your bees at all,

and if so, what and how?

40

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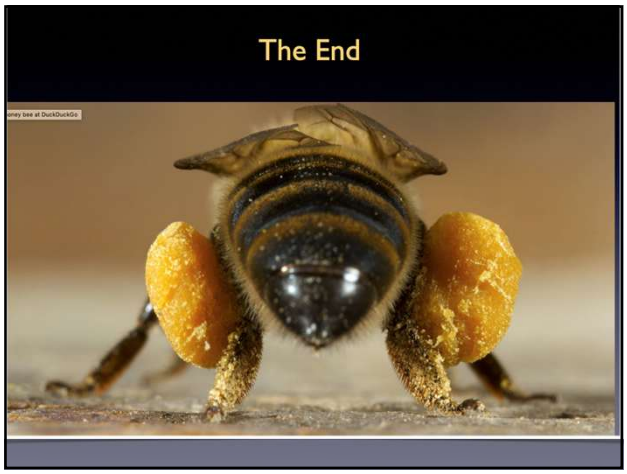
The Hive Body
Genetics
Sugar v Honey

42


The End

43

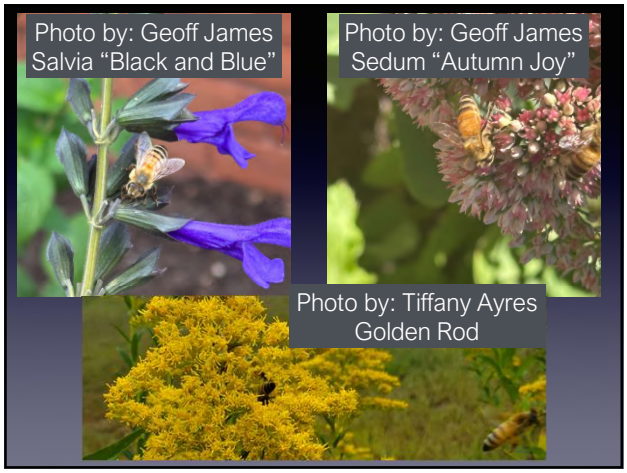


Photo by: Geoff James
Salvia “Black and Blue”
Photo by: Geoff James
Sedum “Autumn Joy”
Photo by: Tiffany Ayres
Golden Rod

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2025 Pennsylvania State Beekeepers Association Fall Conference
Friday, NOV 14 - Sunday, NOV 16, 2025
Ramada Conference Ctr
State College, PA
• Deep Hive of VENDORS
• 1st Ever Pennsylvania Honey Show
• Honey Judge 101 Training Sat., Nov 15
• New PA Honey Queen Crowned
• PA Beekeeper of the Year Award
• LIVE Auction! - Door Prizes - RAFFLES
• Featuring David Burns,
Dr. Nina Sokolov,
Dr. Larry Connor,
Penn State Extension,
AHSTC Senior Honey Judges
& Fellow Beekeepers
Registration is OPEN!
www.pastatebeekeepers.org
www.honeyshowusa.com
THE NORTH AMERICAN
2026
HONEY BEE EXPO
January 8-10, 2026
Kentucky Expo Center - Louisville, KY

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FUTURE MEETINGS
10/1/25
Virtual Optional Meeting
Exam Review

10/8/25
Virtual Meeting
"General Review ~ Exam"

10/22/25 Virtual Meeting
Robert Dwyer ~ State Inspector

10/28/25 TRI-COUNTY BEEKEEPING MEETING
7:00pm Aldersgate Church 397 Tyler Run Rd, York

11/12/25 Virtual Meeting

12/10/25 Virtual Meeting

1/14/26 ~ Virtual Meeting with
CiCi Sweeney

SOUTH CENTRAL PA LOCAL CLUBS

YCBA – meets 4th Tuesday 7:00pm-9:00pm at Aldersgate Church, 397 Tyler Run Rd., York

CABA – meets 3rd Friday 7:00pm-9:00pm at HACC, 1 HACC Dr., Harrisburg

LCBS – meets 3rd Tuesday 6:30pm-8:30pm at Millersville University, Roddy Hall Room 261

PCBC – meets 3rd Sunday 2:00pm at Penn State Ext. Office, 8 S. Carlisle St., New Bloomfield

FCBA – meets 3rd Thursday 6:00pm-8:30pm at locations vary check on website fcbapa.com

PSBA – Conference 11/14/25-11/16/25

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THANK YOU

- KEYS TO BEES
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- Saybees.apiary@gmail.com

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